Installation Guide

hp StorageWorks AB232A PCI-X Host Bus Adapter

Third Edition (June 2004)

Part Number: AA–RU1ZC–TE

This guide describes how to install, configure, and use the diagnostic utilities for the AB232A PCI-X host bus adapter for 64-bit Windows operating systems.

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about this guide

This installation guide provides information to help you:

- Install, configure, and use the diagnostic utilities for the AB232A PCI-X host bus adapter for 64-bit Windows systems.
- Contact technical support for additional assistance.

“About this Guide” topics include:

Overview

This section covers the following topics:

Intended Audience

This book is intended for use by system administrators who are experienced with the following:

- Windows Server 2003 Enterprise Edition, 64-bit version
- Host bus adapters

Related Documentation

In addition to this guide, refer to the *HP StorageWorks AB232A PCI-X Host Bus Adapter Release Notes*.

Conventions

Conventions consist of the following:

- Document Conventions
- Text Symbols
- Equipment Symbols

Document Conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	Italics
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	`<monospace, italic font>`
Website addresses	Blue, underlined sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings.

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website http://www.hp.com.

HP Technical Support

Telephone numbers for worldwide technical support are listed on the HP website http://www.hp.com/support/. From this website, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product, as well as the latest drivers. Access storage at http://h18006.www1.hp.com/storage/saninfrastructure.html.

From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP website for locations and telephone numbers: http://www.hp.com.

Adapter Features

This introduction to the AB232A PCI-X Host Bus Adapter (HBA) includes:

Product Description

The AB232A HBA has the following characteristics:

- Robust suite of software supporting Windows Server 2003 Enterprise Edition, 64-bit version.
- Optical small form factor (LC) interface LC Fibre connector.
- Embedded optical shortwave laser, multi-mode Fibre Channel interface.
- AB232A is designed using a single custom Application Specific Integrated Circuit (ASIC). The custom ASIC implements a very high performance, multiclass, multiprotocol Fibre Channel host adapter with a 64-bit PCI-X bus connection.
- 66/100/133MHz PCI-X 1.0a compatibility.
- AB232A has a 266MIPs onboard processor, an embedded 1GB/2GB SERDES, and a high performance unified QDR SRAM.

Figure 1 illustrates the AB232A HBA.

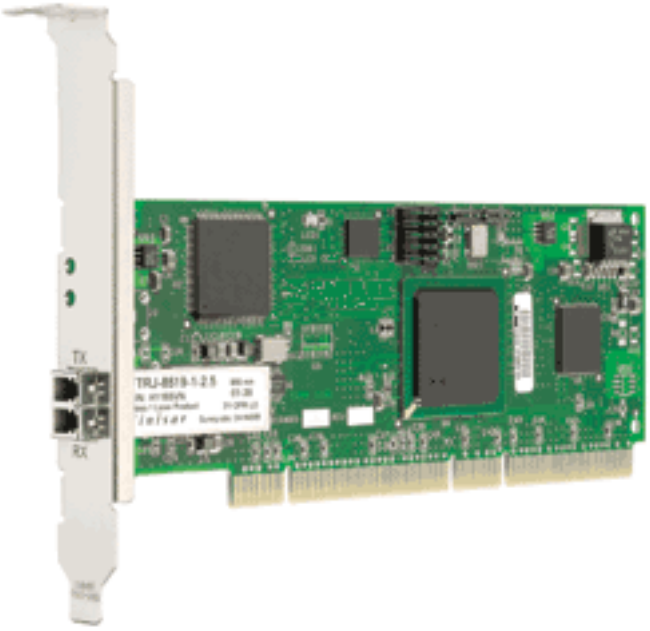

Figure 1: AB232A HBA

- Table 2 describes the AB232A HBA.

Table 2: AB232A HBA Diagram Description

Figure Legend	Description
❶	Fibre Channel (LC) connectors.
❷	POST LEDs indicators **Note**: See Table 3, on page 22 for detailed descriptions.

Performance Specifications

The AB232A HBA offers a highly integrated 2 Gbps Fibre Channel HBA for use in Itanium servers based on the latest PCI-X expansion bus. The features of the AB232A HBA provides the flexibility and broad interoperability needed for complex, highly scalable SANs.

The AB232A HBA also features sophisticated hardware that provides superior performance in SANs and provides best in class server CPU offload. This exclusive hardware delivers low latency and high throughput in switched fabric, arbitrated loop, and clustered environments. Support for fiber optic cabling is provided through an embedded small form factor (LC) optical interface.

The AB232A HBA is both ANSI Fibre Channel and PCI Local Bus Compliant and supports:

- Full duplex 2 Gbps Fibre Channel that provides data transfers of up to 400 MBps.
- Full fabric boot support to multiple LUNs.
- FC-Tape (FC-2) devices.
- Point-to-point, arbitrated-loop, and switch fabric FC connections.
- Storage protocol.
- Fibre Channel class 2 and 3.
- Automatic speed negotiation and topology detection.
- End-to-end parity protection for high data integrity.

Collectively, these characteristics create a high-performance Fibre Channel HBA.

Installation

2

This chapter provides step-by-step instructions for installing the AB232A HBA, including:

- Hardware Requirements
- Recording Reference Numbers
- Installing the HBA into a Computer
- Verifying the Installation
- Configuration Guidelines

This chapter also provides information on installation guidelines and supported configurations for the operating systems.

Caution: The HBAs contain static-sensitive components. Make sure you comply with Electrostatic Discharge (ESD) procedures described on page 59.

Hardware Requirements

The system hardware requirements for installing the HBAs include:

- AB232A HBA requires one open 64-bit/133 MHz PCI-X universal slot.
- Multimode fiber optic cable with LC connector, used with shortwave lasers.

Recording Reference Numbers

Each HBA ships with a unique address identifier that is stored in flash memory. Fibre Channel industry standards issue two unique identifiers: WorldWide Port Name (WWPN) and Node Name (NN), each of which is derived from the HBA's IEEE address. Combined, the WWPN and NN create the WorldWide Name (WWN) which is an 8-byte field that uniquely identifies an HBA on a FC circuit.

The WWN address and serial number are clearly marked on the HBA. Record the addresses on the lines below for future reference.

Note: The WWN is a static identifier that cannot be changed.

IEEE address: _____

Serial number: _____

Installing the HBA into a Computer

Use the following procedure for installing the HBA into a computer.

Caution: Be sure to observe the ESD precautions described on page 59 for this procedure.

1. Make sure the computer is powered off.
2. Remove the screws on the computer cover, and then remove the cover.
3. Wearing a static wrist strap, remove the blank panel from an empty 64-bit PCI-X bus slot.

   Compare the removed panel to the bracket on the HBA. Follow steps 4–7 to change the bracket if the brackets are different sizes.

Note: The HBAs come with a standard PCI bracket installed. The low-profile mounting bracket is shorter than the standard bracket; approximately 7.9 cm (3.11 in.) compared to 12.06 cm (4.75 in.) long.

4. Remove the mounting bracket screws from the top of the HBA.
5. Remove the bracket and store it for future use.
6. Align the new mounting bracket tabs with the holes in the HBA.

Note: Be careful not to push the bracket past the transceiver housing's grounding tabs.

7. Replace the screws that attach the HBA to the bracket.
8. Insert the HBA into the empty PCI-X bus slot; press firmly until it is seated securely.
9. Secure the HBA mounting bracket to the computer panel with the panel screws.
10. Replace the computer cover and secure it using the previously removed screws.

11. Attach media:
    a. Connect the fiber optic cable to the LC connector on the HBA.
    b. Connect the other end of the cable to the Fibre Channel device.

Note: The HBAs do not allow normal data transmission on an optical link unless the link is connected to a similar or compatible laser product. That is, both products are multimode to multimode.

Verifying the Installation

To verify the HBA is properly installed and is operating:

1. Turn on the computer.
2. At power up, observe the POST LED indicators on the HBA. The position of the POST LED indicators is defined in page 15 on page 15, and Table 2 on page 22 of this guide. The green LED indicates power functions and the amber LED signifies port activity. The amber LED blinks at all times during normal operation.

   Table 3 lists normal LED indications.

Table 3: Normal POST LED Indicators

Amber LED (L1)	Green LED (L2)	State
Off	Off	Wake-up failure (dead board)
On	Off	POST failure (dead board)
Slow blink (1 Hz)	Off	Wake-up failure (dead board)
Fast blink (4 Hz)	Off	Failure in POST (dead board)
Flashing (irregular)	Off	POST processing in progress
Off	On	Failure while functioning
On	On	Failure while functioning
Slow blink (1 Hz)	On	Normal—1 Gb link rate
Fast blink (4 Hz)	On	Normal—2 Gb link rate
Off	Blink (1 Hz)	Normal—link down or not yet started

Configuration Guidelines

The software for loading the driver also contains the default registry parameter settings that are loaded as part of the driver installation. Consult the following sources for any restriction and for information on supported configurations specific to your operating system and topology.

- Release Notes
- HP Website at http://www.hp.com/country/us/eng/support.html.

Installing the SCSI Miniport Driver

3

This chapter contains step-by-step instructions for installing the SCSI Miniport driver.

System managers must be familiar with the Windows Server 2003 operating system under which the PCI-X-to-Fibre Channel HBA is to operate. System managers must also have access to standard system documentation.

HBA files are updated periodically. You can download the latest versions of the HBA driver kits from the HP website at http://h18000.www1.hp.com/storage/saninfrastructure.html.

Note: This chapter describes the steps for installing the device driver and for accessing Fibre Channel storage devices. For other configuration changes, see Modify Diagnostic Driver Parameters in the Windows Registry, on page 40.

Device Driver Installation

This section describes the instructions for installing the Windows SCSI Miniport driver.

System Requirements

Ensure that your system meets these minimum requirements:

- Installed HBA
- StorageWorks Fibre Channel Storage subsystem (interconnect device and storage device)

Installing or Upgrading a New Driver

The AB232A HBA is a plug-and-play device that is detected by Windows operating systems. Perform the following steps to add or update the Windows driver to a previously installed Windows system:

1. Install the HBA as described in Chapter 2 on page 17.
2. Restart or turn on the computer.
3. Browse to the the driver kit on the Smart Setup CD-ROM (or one you downloaded from the website if it is more recent).
4. Double-click **cp00*xxxx*.exe**.

Note: Refer to the following website for the information about this Smart Component's final version number:
http://h18000.www1.hp.com/storage/saninfrastructure.html.

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5. Follow the installation wizard instructions.
6. When the installation completes, you must reboot.
7. Repeat step 1 through step 6 for any additional HBAs. Make sure to reboot after installing the driver for the last HBA.

Installing the LightPulse Utility

The LightPulse Utility, *LpUtilNt* (described in Diagnostic and Configuration Utilities, on page 37) does not automatically load. HP recommends that after loading the HBA driver, you install *LpUtilNt* as follows:

1. Browse to the LighPulse folder on the Smart Setup CD-ROM (or to one downloaded from the web site if it is more recent).
2. Double-click **cp00*xxxx*.exe**.

Note: Refer to the following website for the information about this Smart Component's final version number:
http://h18000.www1.hp.com/storage/saninfrastructure.html.

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3. Follow the installation wizard instructions.
4. After the installation completes, you can start the LightPulse Utility by choosing **Start > Programs > LpUtilNt**.

Troubleshooting

4

The Power-On Self Test (POST) and the Windows Event Viewer are utilities you can use for troubleshooting the HBA. This chapter explains the use of these utilities in the event of an HBA problem.

POST Conditions and Results

Table 4 lists the HBA LED states with descriptions of each.The position of the POST LED indicators is defined in Figure 1 on page 15, and Table 3 on page 22 of this guide.

If the LEDs indicate a failure during POST:

1. Make sure that the HBA is seated firmly in the PCI slot.
2. Verify that the fiber cable connection to the HBA is secure.

Table 4: Normal POST LED Indicators

Amber LED (L1)	Green LED (L2)	State
Off	Off	Wake-up failure (dead board)
On	Off	POST failure (dead board)
Slow blink (1 Hz)	Off	Wake-up failure (dead board)
Fast blink (4 Hz)	Off	Failure in POST (dead board)
Flashing (irregular)	Off	POST processing in progress
Off	On	Failure while functioning
On	On	Failure while functioning
Slow blink (1 Hz)	On	Normal—1 Gb link rate
Fast blink (4 Hz)	On	Normal—2 Gb link rate
Off	Blink (1 Hz)	Normal—link down or not yet started

Using The Event Viewer

The Windows SCSI driver verifies the condition of the HBA POST. If there is a failure or a suspected failure, an error log entry is issued to the Windows Event log.

Following is the procedure for viewing the event log.

From the Main menu:

1. Double-click or choose the **Administrative Tools** program group.
2. Double-click or choose the **Event Viewer**.
3. Specify **LPXNDS**.

Note: You can find the source name in the SCSI device's Disk Manager.

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4. Double-click any event with the source name.
5. Change the data view from **Bytes** (default) to **Words**.
6. Examine the entry at offset 0x10: if the low byte = En, match the low byte with the error found in Table 5 on page 32, SCSI Port Error Log. Table 6 on page 34, and Table 7 on page 35 list CmdStat values and Parameter error values.

Windows Miniport Event Log Codes

The Windows Miniport driver logs events and errors in the Windows Event log. Serious errors are always logged. Informational events are only logged if the registry parameter LogError=1 is used.

All Miniport logged events are issued with an Event ID of 11 (INTERNAL ADAPTER ERROR) but do not necessarily indicate an HBA error occurred. Byte offset 0x10 of the event is the driver event code. Byte offsets 0x11 to 0x13 contain event-specific information.

Table 5 describes the SCSI port error log codes.

Table 5: SCSI Port Error Log Codes

0x10 Offset	Explanation	0x11 to 0x13 Further Information
0xD0	SNS_REQ (XMIT_SEQ failed)	0x11 = cmdstat, 12 = parm err
0xD1	SNS_RSP (RCV_SEQ failed)	0x11 = cmdstat, 12 = parm err
0xD3	RCV_ELS_REQ failed	0x11 = cmdstat, 12 = parm err
0xD4	XMT_ELS_REQ failed	0x11 = cmdstat, 12 = parm err
0xD5	Too many targets found (160+)	0x11 to 13 = D_DID that didn't fit
0xD6	SNS request time-out	0x11 to 13 = no additional information
0xD7	Mailbox interrupt time-out	0x11 = mailbox word 0
0xD8	TPRLO requested when busy	0x11 = local req. state, 12 = discstate, 13 = mailbox word 0
0xD9	Link down time-out occurred	0x11 = local req. state, 12 = discstate, 13 = mailbox word 0
0xDA	Hard link down time-out occurred	0x11 = local req. state, 12 = discstate, 13 = mailbox word 0
0xE1	Error interrupt occurred	Status register bytes 1–3 in event 11–13. E1 error indicates an HBA hardware failure, return HBA for repair.
0xE2	Mailbox cmd time-out	0x11 = command

Table 5: SCSI Port Error Log Codes (Continued)

0x10 Offset	Explanation	0x11 to 0x13 Further Information
0xE3	Mailbox rsp err	0x11 = command, 12–13 = mbxstatus
0xE4	HBA not ready after init	Status register bytes 1–3 in event 11–13
0xE5	Requested loop but link = PT–PT	
0xE6	Mailbox int. but cmd not complete	0x11 = MB cmd, 12–13 = mbxstatus
0xE7	SRB already queued to ring	
0xE8	RESTART failed	
0xE9	PORT BYPASS (LPB) received	
0xEB	Unknown IOCB cmd rsp	0x11 = 15:8 = cmd field
0xEC	Uncached extension alloc. error	
0xED	Link down @ boot time (30 sec)	
0xEF	Too many interrupts at initial boot	
0xF1	LinkUp error; LP8 down, driver up	0x11 = parameter field, 12 = IOCB cmd
0xF2	LinkUp w/ illegal or corrupt RPI	0x11 = parameter field, 12 = IOCB cmd
0xF3	DeQueue ring->iotcmd.head	0x11 = caller ID
0xF4	HBA reset	0x11 = coded reason for reset: Bit 0 = IOCB requeue; bit 1 = readla retry Bit 2 = initlink retry; bit 3 = rstbus retry Bit 4 = mailbox time-out
0xF5	PCP_IXXX_CR IOCB rsp err	0x11 = cmdstat, 12 = parm err, 13 = ALPA

Table 5: SCSI Port Error Log Codes (Continued)

0x10 Offset	Explanation	0x11 to 0x13 Further Information
0xF6	PCP_IXXX_CR IOCB rsp err	0x11 = cmdstat, 12 = parm err, 13 = ALPA
0xF7	Ring hd !=0 && pendingsrb!=NULL	
0xF8	Invalid FCP_RSP	0x11 = pcpcntrl, 12 = scsisat, 13 = len
0xF9	Two consec. time-outs, issue LIP	
0xFA	START_IO error	0x11 = errtype, 12 = srbstat, 13 = linkup
0xFB	ELS_REQ_CR IOCB rsp err	0x11 = cmdstat, 12 = parm err, 13 = ALPA
0xFC	ELS_REQ_CR IOCB rsp err	0x11 = cmdstat, 12 = parm err, 13 = ALPA
0xFE	FLOGI failed	0x11 = cmdstat, 12 = parm err
0xFF	SNS_PLOGI failed	0x11 = cmdstat, 12 = parm err

Table 6: CmdStat Values

0x11 Offset	Explanation	Further Information
0x1	IOSTAT_FCP_RSP_ERR	
0x2	IOSTAT_REMOTE_STOP	Remote sent an ABTS
0x3	IOSTAT_LOCAL_REJECT	Parameter field contains additional information
0x4	IOSTAT_NPORT_RJT	
0x5	IOSTAT_FABRIC_RJT	
0x6	IOSTAT_NPORT_BSY	
0x7	IOSTAT_FBRIC_BSY	

Table 6: CmdStat Values (Continued)

0x8	IOSTAT_INTERMED_RSP	
0x9	IOSTAT_LS_RJT	Remote sent LS_RJT
0xA	IOSTAT_BA_RJT	Remote sent BA_RJT

Table 7: Parameter Error Values Valid only when CmdStat=0x3

0x12 Offset	Explanation	Further Information
0x00	IOERR_SUCCESS	
0x01	IOERR_MISSING_CONTINUE	
0x02	IOERR_SEQUENCE_TIMEOUT	Possible bad cable/link noise
0x03	IOERR_INTERNAL_ERROR	
0x04	IOERR_INVALID_RPI	Remote port login data invalid
0x05	IOERR_NO_XRI	
0x06	IOERR_ILLEGAL_COMMAND	
0x07	IOERR_XCHG_DROPPED	
0x08	IOERR_ILLEGAL_FIELD	
0x09	IOERR_BAC_CONTINUE	
0x0A	IOERR_TOO_MANY_BUFFERS	
0x0B	IOERR_RCV_BUFFER_WAITING	
0x0C	IOERR_NO_CONNECTION	
0x0D	IOERR_TX_DMA_FAILED	
0x0E	IOERR_RX_DMA_FAILED	
0x0F	IOERR_ILLEGAL_FRAME	Possible bad cable/link noise
0x10	IOERR_EXTRA_DATA	
0x11	IOERR_NO_RESOURCES	
0x12	IOERR_RESERVED	
0x13	IOERR_ILLEGAL_LENGTH	
0x14	IOERR_UNSUPPORTED_ FEATURE	
0x15	IOERR_ABORT_IN_PROGRESS	

Table 7: Parameter Error Values Valid only when CmdStat=0x3 (Continued)

0x12 Offset	Explanation	Further Information
0x16	IOERR_ABORT_REQUESTED	
0x17	IOERR_RECEIVE_BUFFER_ TIMEOUT	
0x18	IOERR_LOOP_OPEN_FAILURE	FC_AL target not responding. Received our own transmitted frame back. Port may be bypassed by a hub.
0x19	IOERR_RING_RESET	
0x1A	IOERR_LINK_DOWN	
0x1B	IOERR_CORRUPTED_DATA	
0x1C	IOERR_CORRUPTED_RPI	
0x1D	IOERR_OUT_OF_ORDER	Possible bad cable/link noise
0x1E	IOERR_OUT_OF_ORDER_ACK	
0x1F	IOERR_DUPLICATE_FRAME	
0x20	IOERR_INVALID_ACK	
0x21	IOERR_BAD_40BIT_ADDRESS	
0x22	IOERR_RESERVED	
0x23	IOERR_RESERVED	
0x24	IOERR_RESERVED	
0x25	IOERR_ABORT_MULTI_ REQUESTED	
0x26	IOERR_RESERVED	
0x27	IOERR_RESERVED	
0x28	IOERR_LINK_BUFFER_ SHORTAGE	
0x29	IOERR_RCV_XRIBUF_WAITING	

Diagnostic and Configuration Utilities

5

This chapter contains instructions for using the LightPulse Utility, *LpUtilNt,* a Windows-based graphical user interface. Use this utility to update firmware, BIOS, view registry parameters, perform persistent binding operations on selected targets, and obtain specific information about all HBAs installed in the server.

Using LightPulse Utility

The LightPulse Utility (*LpUtilNt*) is an HBA utility that lets you:

- View HBA parameters
- Modify driver parameters in the Windows registry

The Original Equipment Manufacturer (OEM) setup file provided in the software kit sets these parameters. The Fibre Channel setup file that comes with the platform kit, modifies these parameters. The resulting parameter settings provide the optimal setting for your configurations.

Note the following:

- You must install and connect the SCSI Miniport driver to at least one drive before LightPulse Utilitycan operate properly. You can alternately set the registry parameter **Simulate Device=**1.
- LightPulse Utility does not load automatically on Windows Server 2003 systems. HP recommends that you install the LightPulse utility after installing the HBA drivers as described in the section Installing the LightPulse Utility on page 27.

View HBA Parameters

From the LightPulse Utility Main menu screen:

1. Choose an HBA.
2. On the menu bar, click on an HBA or pull down the category list.
3. Choose an option to view HBA parameters.

   Each of the following options displays a different group of HBA parameters:

   - Adapter Revision Levels—View information about the chipset and firmware revision levels of the selected HBA.
   - Firmware Maintenance—View detailed information about the firmware in the flash ROM of the selected host adapter. Update host adapter firmware and boot code, manage existing firmware, and enable or disable the BootBIOS bootup message.
   - Loop Map—View a list of the members of the selected HBA loop map.
   - PCI Registers—View the values of the PCI configuration registers for the selected HBA.

- Configuration Data—View information about the data in each of the configuration regions in the flash ROM of the selected HBA.
- Drive Parameters—View information about device driver parameters that are maintained in the Windows/NT registry.
- Persistent Binding—View and manage persistent binding for the adapter, and LUN mapping and masking for devices in your SAN.
- Link Statistics—View statistics about the arbitrated loop of the selected HBA.
- Status and Counters—View status and counters for bytes, frames, sequences, exchanges, and so on.

4. Expand the category list and choose **Firmware Maintenance**.
5. Click **Download**.
6. Locate the new upgrade file.
7. Click **Open**.

Note: The new software is transferred to the HBA.

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8. Expand the category list and choose **Adapter Revision Levels**.
9. Verify that the new firmware revision is shown.

Modify Diagnostic Driver Parameters in the Windows Registry

This screen provides information about device driver parameters that are maintained in the Windows registry and allows you to modify those values.

Caution: Do not modify the registry parameters unless specifically instructed to do so by support personnel. Modifying registry parameters can result in an unstable SAN.

The data display lists all available device driver parameters, along with the current, minimum, maximum, and default values. Parameters that have their value specified in the system registry are denoted with either a **G** or an **L** in the left-most column of the screen. The **G** indicates that the value is set in the global registry entry, which applies to all HBAs that do not have a local registry entry. The **L** indicates that the value is set in a registry entry specific to the selected HBA, which overrides the value settings in the global entry.

Modify the Driver Parameters

From the LightPulse Utility Main menu screen:

1. Choose the desired HBA.
2. Expand the category list and choose **Driver Parameters**.
3. Double-click a **Parameter Name**.
4. Enter the desired value in the **New Value** field.
5. Choose the **Permanent** or **Global** checkbox:
   - Choose **Permanent** to cause the new value to be written to the system registry. If Permanent is not selected, the parameter reverts to its default value when the driver is reset.
   - Choose **Global** to change the global registry entry. Otherwise, the change is made to the HBA-specific registry entry.

Table 8 lists the current parameters that you can set.

Table 8: Drive Parameters

Parameter	Description
AbortStatus = 0xn	Values from 0x00 – 0xFF. Controls NT SRB error status for general Abort conditions. Default = SRB_STATUS_BUS_RESET (0x0E) which will not cause the current NT class driver to throttle down I/O performance after four of these errors have been received (on a per-LUN basis).
ALTOV = n	Values are in milliseconds from 1 to 15. Default = 15.
ARBTOV = n	Values are milliseconds from 500 to 10000. Default = 1000. Represents FC_AL arbitration time-out prior to LIP.
Class = n	Values from 0 to 2. Default = 2. Controls which Fibre Channel Class will be used: 0 = Class 1, 1 = Class 2, 2 = Class 3.
EDTOV = n	Values are in milliseconds from 500 to 10000. Default = 1000. Represents error detect time-out value prior to LIP.
EnableDPC = n	Values 0 or 1. Default = 0. 0 = process I/O completion at interrupt level, 1 = process at DPC level.
FrameSizeMSB = n	Values from 1 – 8. Default = 8. Controls the upper byte of the receive FrameSize if issued in PLOGI. This allows the FrameSize be constrained on 256 byte increments from 256 (1) – 2048 (8).
HardALPA = 0xn	Values from 0x01 – 0xEF. Default = 0x01 allows the HBA use a hard assigned loop address. NOTE: Only valid ALPAs can be used (see Table 9 on page 44).
LinkTimeOut = n	Values are in seconds from 1 – 500. Default = 60. Controls the time-out at which link no longer busy with requests but issues SELECTION_TIMEOUT error status.
LogErrors = n	Values 0 or 1. Default = 0. 0 = don't log general HBA/drive errors. 1 = use Event Log to log general errors.
NodeTimeOut = n	Values are in seconds from 1–255. Default = 10. Controls the time-out at which a formerly logged-in node will issue SELECTION_TIMEOUT error status to an I/O request.

Table 8: Drive Parameters (Continued)

Parameter	Description
QueueDepth = n	Values from 1–64 (decimal). Default = 64. Requests per LUN/Target (see Queue Target parameter).
QueueTarget = n	Values 0 or 1 (decimal). Default = 0. 0 = QueueDepth applies on a per LUN basis: 1 = QueueDepth applies on a Target basis.
RATOV = n	Values are in seconds from 2 to 120. Default = 2. This value is the ELS request time-out.
ReadCheck = n	Values 0 or 1. Default = 1. 0 = do not enable byte counting for read operations. 1 = enable byte counting. If bytes counted are less than requested transfer count, issue underrun.
ResetFF = n	Values 0 or 1. Default = 1. 0 = ResetBus translates to LIP (F7). 1 = ResetBus translates to LIP (FF). Used for WolfPack to force reservations to be freed when ResetBus issued. Only meaningful for FC_AL topology and Seagate native FC hard drives.
ResetTPRLO = n	Values 0 or 1. Default = 1. 0 = ResetBus translates to LIP (). 1 = ResetBus translates to ThirdPartyProcessLogout + LIP (). Used for WolfPack to force reservations to be freed when ResetBus is issued.
RetryInterval = n	Values are in seconds from 2-255. Default = 45. Used for time-out interval if RetryloTimeOut = 1. Must be shorter than Class driver TimeOutInterval.
RetryloTimeOut = n	Values 0 or 1. Default = 1. 1 = allows HBA to time-out I/O prior to port driver's time-out that causes a LIP/Link Reset.
RTTOV = n	Values are in milliseconds from 100 to 511. Default = 256. Represents time-out between phases of Off-line to On-line protocol.
ScanDown = n	Values 0 or 1. Default = 0. 0 = Lowest AL_PA = Lowest physical disk (ascending AL_PA order). 1 = Highest AL_PA = Lowest Physical Disk (ascending SEL_ID order).

Table 8: Drive Parameters (Continued)

Parameter	Description
SilFlags = n	Values from 0-2. Default = 0. Controls which driver interface to use. 0 = automode; attempt SLI-2 first. If that fails, uses SLI-1. 1 = always use SLI-1. 2 = always use SLI-2.
SimulateDevice = n	Values 0 or 1. Default = 0. 0 = do not create a “dummy” disk device. 1 = create a dummy disk to force the driver to load even if no disk devices are present at boot time.
SnsALL = n	Values 0 or 1. Default = 1. Controls which N_Ports are queried from the NameServer. 0 = SCSI FCP only. 1 = All N_Ports.
Topology = n	Value 0 through 3. Default = 2. 0 = FC_AL (loop), 1 = PT-PT Fabric, 2=FC-AL first, then attempt PT-PT, 3=PT-PT first, then attempt FC-AL. When set to 1, FLOGI, SCR/RSCN and NameServer queries are employed.
TrafficCop = n	Values 0 or 1. Default = 0. 1 = enable FC-AL loop master to run unfair and break potential arbitration problems by sending frames to itself. 0 = run fair all the time.

Table 9 lists the Arbitrated Loop Physical Addresses (AL-PA) you can set.

Table 9: AL-PA Values

0x01	0x02	0x04	0x08	0x0F	0x10	0x17	0x18	0x1B
0x1D	0x1E	0x1F	0x23	0x25	0x26	0x27	0x29	0x2A
0x2B	0x2C	0x2D	0x2E	0x31	0x32	0x33	0x34	0x35
0x36	0x39	0x3A	0x3C	0x43	0x45	0x46	0x47	0x49
0x4A	0x4b	0x4C	0x4D	0x4D	0x51	0x52	0x53	0x54
0x55	0x56	0x59	0x5A	0x5C	0x63	0x65	0x66	0x67
0x69	0x6A	0x6B	0x6C	0x6D	0x6E	0x71	0x72	0x73
0x74	0x75	0x75	0x79	0x7A	0x7C	0x80	0x81	0x82
0x84	0x88	0x8F	0x90	0x97	0x98	0x9B	0x9D	0x9E
0x9F	0xA3	0xA5	0xA6	0xA7	0xA9	0xAA	0xAB	0xAC
0xAD	0xAE	0xB1	0xB2	0xB3	0xB4	0xB5	0xB6	0xB9
0xBA	0xBC	0xC3	0xC5	0xC6	0xC7	0xC9	0xCA	0xCB
0xCC	0xCD	0xCE	0xD1	0xD2	0xD3	0xD4	0xD5	0xD5
0xD9	0xDA	0xDC	0xE0	0xE1	0xE2	0xE4	0xE8	0xEF

Set Up Persistent Binding

The persistent binding feature allows you to control the devices that are to be presented to the system.

The Miniport driver detects all devices attached to the HBAs. Global automapping assigns a binding type, target ID, SCSI bus, and SCSI ID to the device. The binding type, SCSI bus, and SCSI ID may change when the system is rebooted. When persistent binding is applied to one of these targets, the binding type, SCSI bus, and SCSI ID remain the same, whether the system is rebooted or whether **Global Automap All Targets** is subsequently disabled (enabled by default).

The binding information is permanent because it is stored in the Windows registry. The driver refers to the binding information at bootup.

Persistent binding permanently maps a device to the following:

- Binding type World Wide Port Name (WWPN), World Wide Node Name (WWNN), or a Destination Identifier (D_ID)
- SCSI bus
- SCSI ID

Prerequisites

- Installed Miniport driver with the adjunct driver
- Installed LightPulse Utility
- **Global Automap All Targets** is enabled. **Global Automap All Targets** is enabled or disabled from the **Global Automap** window

Setting Up Persistent Binding

From the LightPulse Utility Main menu screen:

1. Choose the desired HBA.
2. Expand the category list and choose **Persistent Binding**.
3. Click on a target and click **Add**. The **Add Binding** window displays, as shown in Figure 2.

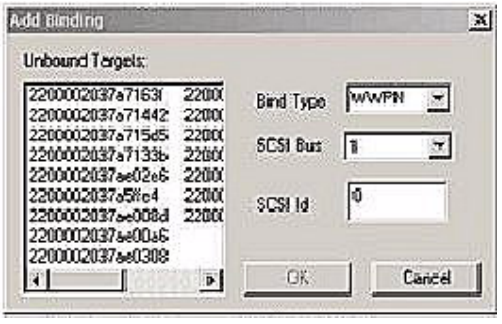

Figure 2: Add Binding window

4. Click the target to be bound from the **Unbound Targets** list.
5. If required, change the **Bind Type** for the target.
6. If required, change the **SCSI Bus** and **SCSI ID** values.
7. Click **OK**. The letters **PB** display next to the target row.

Global Automap and Unmasking Overview

Global Automap All Targets defaults to **enabled**, to allow the driver to detect all Fibre Channel devices attached to the HBAs. If **Global Automap All Targets** is disabled, the driver detects Fibre Channel devices attached to the HBA, and does not pass them to the operating system unless they are already persistently bound.

Global Automap All LUNs defaults to **enabled** and assigns an operating system LUN ID to a Fibre Channel LUN ID for all LUNs behind the targets in your SAN. LUN mapping can also be enabled and disabled at the target level. Global automapping of LUNs is different from persistent binding. Global LUN automapping does not concern itself with the SCSI ID or SCSI Bus. This is because the global LUN mapping stays the same for the target when the system is rebooted.

Globally Unmask All LUNs defaults to **enabled**, to allow the operating system to see all LUNS behind targets. If **Globally Unmask All LUNS** is set to **disabled** and you want the operating system to see all LUNS behind a specific target, you must set unmasking at the target level.

Prerequisites

- Installed SCSI Miniport driver
- Installed LightPulse Utility
- A target device with LUNs that have been properly configured
- LUN Automap enabled and LUN Unmasking disabled on the LUN Mapping window:
  - If LUN Automap is enabled for the target, you can map each LUN individually.
  - Unless LUNs were previously mapped, if LUN Automap is disabled for the target, no LUNs will be mapped when you reboot the system.
  - If LUN Unmasking is disabled for the target, the HBA can see all LUNS behind a specific target.

Mapping and Masking LUNs

From the LightPulse Utility Main menu screen:

1. Choose the desired HBA.
2. Expand the category list and choose **Persistent Binding**.
3. Click on a target. The **Lunmap** button becomes active.
4. Click **Lunmap**. The **Lunmap** window displays, as shown in Figure 3:

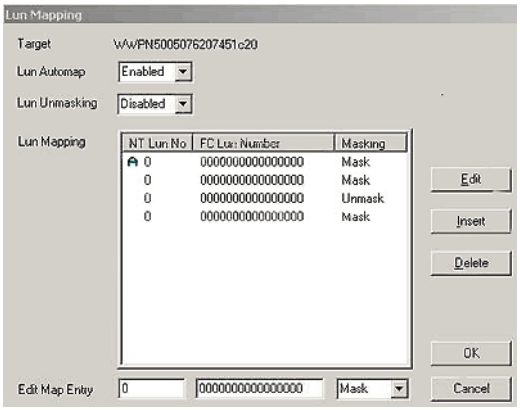

Figure 3: Lunmap window

Test Host Bus Adapters

Choose this option to run host-based internal and external loopback tests on the HBAs.

From the LightPulse Utility Main menu screen:

1. Choose **Test Host Bus Adapters**.
2. Enable or disable the external loopback tests:
   a. Enable the external loopback tests by choosing **1=Y**. The default is disabled, **0=No**. Internal BIU PCI loopback and other loopback tests are run automatically.
   b. Choose **0=No** if you do not have an external loopback connector.

Note: Testing the HBA while it is connected to an arbitrated loop is not recommended.

Modify Test Options

Use this option to specify the number of passes on one or more of these tests: PCI loopback, internal loopback, external Loopback, or all three.

From the LightPulse Utility Main menu screen:

1. Choose **Test**.
2. Choose the following data for the PCI loopback, Internal loopback, External Loopback tests:
   a. The number of passes. The default is 0x50. 0=infinity
   b. The action to take upon encountering errors. Choose one of the following:
      — 0 = stop (default)
      — 1 = repeat
      — 2 = ignore

Restart Host Bus Adapters

Choose this option to reset the HBA. When a restart HBA occurs, the HBA performs POST testing and reloads functional firmware.

Input/Output

Choose this option to open or close input and output files. The contents of the input file are interpreted and executed by the program. The output file contains a log of all messages. Note that nesting of input files is not supported.

Maintenance

Choose this option to update firmware or non-volatile parameters in the flash ROM. This option also displays program images (load list) stored in the HBA memory. You must reboot the HBA for the new firmware to take effect.

Show Host Bus Adapter Info

Choose this option to display HBA data in these areas:

- BIU PCI Configuration Parameters
- HBA Info and Status
- Adapter Revisions
- Display Configuration Data
- Service Parameters
- Status/Counters Info
- Link Status
- Link Attention

Quit the LightPulse Utility

Choose this option to exit the program. A warning message indicates if any errors were encountered during the session.

Regulatory Compliance Notices

This appendix covers the following topics:

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or ID on the label. After the class of the device is determined, refer to the corresponding statement in the sections below.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Declaration of Conformity for Products Marked with FCC Logo—United States Only

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

Network and Serial Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

IEC EMC Statement (Worldwide)

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Spécification ATI Classe A (France)

DECLARATION D'INSTALLATION ET DE MISE EN EXPLOITATION d'un matériel de traitement de l'information (ATI), classé A en fonction des niveaux de perturbations radioélectriques émis, définis dans la norme européenne EN 55022 concernant la Compatibilité Electromagnétique.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parenthesis):

- EN55022 1998 (CISPR 22)-Electromagnetic Interference
- EN55024 1998 (IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11)-Electromagnetic Immunity
- EN60950 (IEC60950)-Product Safety
- Power Quality: (IEC610000-3-2)-Harmonics and (IEC61000-3-3)-Voltage Fluctuations and Flicker
- Also approved under UL 1950, 3rd Edition/CSA C22.2 No. 950-95, Safety of Information Technology Equipment

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

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Harmonics Conformance (Japan)

高調波ガイドライン適合品

German Noise Declaration

Schalldruckpegel Lp = 70.3 dB(A)
Am Arbeitsplatz (operator position)
Normaler Betrieb (normal operation)
Nach ISO 7779:1988 / EN 27779:1991 (Typprüfung)

Laser Safety

WARNING: To reduce the risk of exposure to hazardous radiation:

- Do not try to open the laser device enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP authorized service technicians to repair the laser device.

Certification and Classification Information

This product contains a laser internal to the Optical Link Module (OLM) for connection to the Fiber communications port.

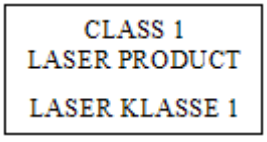
In the USA, the OLM is certified as a Class 1 laser product conforming to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the plastic OLM housing.

Outside the USA, the OLM is certified as a Class 1 laser product conforming to the requirements contained in IEC 825-1:1993 and EN 60825-1:1994, including Amendment 11:1996.

The OLM includes the following certifications:

- UL Recognized Component (USA)
- CSA Certified Component (Canada)
- TUV Certified Component (European Union)
- CB Certificate (Worldwide)

The following figure shows the Class 1 information label that appears on the metal cover of the OLM housing.



Electrostatic Discharge

B

To prevent damaging the system, you must take precautions when setting up the system or when handling parts. A discharge of static electricity from a finger or other conductor may damage system adapters or other static-sensitive devices. This type of damage can reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper grounding, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized reseller install the part.

Note: For more information on static electricity, or for assistance with product installation, contact your HP authorized reseller.

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